

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS:

In the claims

This listing of the claims replaces all other listing of claims. Please cancel claim 23, add new claim 36, and amend claims 1, 3-7,14,16-18, 22, 24, and 26-35 as follows:

1. (currently amended) An apparatus to measure micro-forces due to interactions between a predetermined substance and a sensing material that binds the substance, the apparatus comprising:

a cantilever palette including a plurality of cantilever array blocks, each cantilever array block including a plurality of cantilevers, each cantilever including a plurality of cantilever fingers surrounded by a frame with frame fingers, the cantilever fingers and the frame fingers forming a diffraction grating, wherein each cantilever finger in the array block comprises the sensing material selected to interact with the being configured to be responsive to a chemical mechanical force created by presence of a substance predetermined for measurement by the apparatus substance upon exposing the cantilevers in the cantilever array block to the substance, such that cantilevers of the cantilever array block deflect in the presence of the predetermined substance, causing the diffraction grating to diffract light and thereby provide a change in a diffraction pattern or color of the diffracted light, as a visual indication of the presence of the substance, and wherein the apparatus does not require an external source of electrical power for the cantilever palette.

2. (canceled)

3. (currently amended) The apparatus of claim 1 2 wherein chemical

~~mechanical force is created by the presence of a predetermined~~ the substance is a chemical.

4. (currently amended) The apparatus of claim 1 wherein the ~~predetermined~~
~~micro-force is a chemical mechanical force created by~~ substance is an antibody or an
antigen interaction.

5. (currently amended) The apparatus of claim 1_2 wherein each cantilever array block of the plurality of cantilever array blocks comprises one of a plurality of different sensing materials, respectively, and each sensing material interacts with ~~is configured to be responsive to~~ a different predetermined substance.

6. (currently amended) The apparatus of claim 1_2 wherein each cantilever array block of the plurality of cantilever array blocks comprises sensing material that interacts with ~~is configured to be responsive to~~ a predetermined level of a single predetermined substance.

7. (currently amended) The apparatus of claim 1_2 wherein the plurality of cantilever array blocks includes cantilever array block subsets, each cantilever array block subset comprises sensing material that interacts with ~~being configured to be responsive to~~ a different predetermined substance, respectively, and each cantilever array block within each cantilever array block subset comprises sensing material that interacts with ~~being configured to be responsive to~~ a predetermined level of the predetermined substance.

8-11. (canceled)

12. (original) The apparatus of claim 1 further comprising image enhancement devices selected from the group consisting of: a beam splitter, a visible lens, and a spatial filter.

13. (previously amended) The apparatus of claim 1 further comprising a pin hole array attached to the cantilever palette.

14. (currently amended) A method of identifying the presence of a chemical substance in a liquid test environment, the method comprising the steps of:

forming a cantilever palette including a plurality of cantilever array blocks, each cantilever array block including a plurality of cantilevers, each cantilever including a plurality of cantilever fingers surrounded by a frame with frame fingers, the cantilever fingers and the frame fingers forming a diffraction grating, wherein the cantilever fingers comprise a sensing material selected to preferentially bind each cantilever array block being configured to be responsive to the presence of a predetermined and thereby identify the presence of the substance, wherein the cantilever palette does not require an external electrical power source;

exposing the cantilever palette to the test liquid comprising the a substance, thereby causing cantilevers of the cantilever array block to deflect such that the diffraction grating produces diffracted light; and

visually observing the diffracted light from the diffraction grating to identify the presence of the substance.

15. (canceled)

16. (currently amended) The method of claim 14 ~~15~~ wherein further comprising prior to the forming step, includes the step of forming configuring each cantilever array block of the plurality of cantilever array blocks to be responsive to a different predetermined substance.

17. (currently amended) The method of claim 14 ~~15~~ wherein further comprising prior to the forming step, includes the step of forming configuring each cantilever array block of the plurality of cantilever array blocks to be responsive to a predetermined level of a single predetermined substance.

18. (currently amended) The method of claim 14 ~~15~~ wherein further comprising prior to the forming step, includes the step of forming selecting different substances and levels of each of a plurality of substances to be identified; forming

cantilever array block subsets; and configuring each cantilever array block subset configured to be responsive to a different predetermined substance, and configuring each cantilever array block within each cantilever array block subset configured to be responsive to a predetermined level of the predetermined substance.

19-21. (canceled)

22. (currently amended) The apparatus of claim 1, wherein the cantilever fingers of the cantilever palette interact with the substance in the liquid, and deflect from an initial position with respect to the frame fingers of the cantilever palette, to alter the diffraction grating, due to exposure with the predetermined substance.

23. (canceled)

24. (currently amended) The apparatus of claim 22 23, wherein the sensing material comprises a monoclonal antibody and the predetermined substance comprises an antigen, wherein the monoclonal antibody binds to the antigen and the cantilever fingers deflect in the presence of the antigen.

25. (previously added) The method of claim 14, wherein observing the diffracted light in the test environment further comprises comparing diffraction of incident light prior to and after exposing the cantilever palette to the test environment.

26. (currently amended) The method of claim 25, wherein:
exposing the cantilever palette to the test environment further includes exposing the cantilever palette to incident white light;
~~exposing the cantilever palette to the test environment is further exposing the predetermined binding reagent capable of binding to a predetermined chemical substance;~~
and

~~visually observing the diffracted light comprises visually observing~~ the diffracted light for a change in color, pattern, or intensity to determine if the predetermined

substance is preferentially bound to the cantilevers to identify the physical property which is at least one of the presence of the predetermined ~~ehemical~~ substance and the level of the predetermined substance.

27. (currently amended) The method of claim 26, wherein the providing a cantilever palette further includes providing cantilever fingers comprise comprising a sensing material binding reagent which is a biomolecule that which preferentially binds to the predetermined ~~ehemical~~ substance.

28. (currently amended) The method of claim 27, wherein the providing cantilever fingers comprising a biomolecule comprises further includes providing cantilever fingers comprising a monoclonal antibody, and the predetermined ehemical substance comprises comprising an antigen that binds to the monoclonal antibody, wherein the cantilever fingers deflect in response to a micro force created by binding of the antigen.

29. (currently amended) The method of claim 14, wherein observing the diffracted light in the test environment further comprises comparing diffraction of incident light after exposing the cantilever palette to the test environment, and to an control environment in the absence of the substance or in the presence of a predetermined amount of the substance.

30. (currently amended) An apparatus to detect a substance in an environment, comprising:

a cantilever array block, the cantilever array block including a plurality of cantilevers comprising having a plurality of cantilever fingers surrounded by a frame with a plurality of frame fingers, the cantilever fingers and frame fingers forming a diffraction grating, the cantilever fingers array block having the cantilever comprising a substrate material and a sensing material which is predetermined to respond to the substance, wherein the such that cantilevers of the cantilever array block fingers deflect in a presence of the substance a predetermined micro force, causing the diffraction grating to diffract light and thereby provide visual indicia of the physical property, and the cantilever array block does not require an external electrical power source.

31. (previously added) The apparatus of claim 30, wherein the visual indicia of the diffraction grating are selected from a group of changes in diffraction consisting of changes in color, changes in intensity, and changes in pattern of the diffracted light.

32. (currently amended) An apparatus to measure a chemical-mechanical micro-force, comprising:

a cantilever palette including at least one cantilever array block, the at least one cantilever array block including a plurality of cantilevers with cantilever fingers, the cantilever fingers surrounded by a frame with frame fingers, the cantilever fingers and the frame fingers forming a diffraction grating, wherein the cantilever fingers comprise a ~~micro force-creating material selected as which is~~ binding reagent, such that in a presence of a ligand of the binding reagent, ~~a chemical mechanical micro force is created~~ and the cantilever fingers deflect, causing the diffraction grating to diffract light and thereby provide visual indications of ~~the~~ a presence of the ~~ligand~~ chemical mechanical micro force, wherein the apparatus does not require an external electrical power source.

33. (currently amended) A sensor for detecting a chemical substance physical property, the sensor comprising:

a first cantilever array including a plurality of first cantilever fingers, each first cantilever finger including a sensing force-creating material, such that the sensing force-creating material in a presence of the substance binds to the first cantilever fingers, wherein binding causes the first cantilever fingers to bend in a presence of the substance;

a second cantilever array including a plurality of second cantilever fingers, the first and second cantilever arrays being disposed with respect to each other such that the first cantilever fingers are surrounded by interleaved with the second cantilever fingers; wherein

the first and second cantilever fingers forming a diffraction grating having an effect on the light from a light source, wherein the effect of the diffraction grating on the light varies as the first cantilevers bend, such that the variation of the effect corresponds to a variation in the presence of the substance, wherein the apparatus does not require an external electrical power source.

34. (currently amended) The A sensor of according to claim 33, wherein the sensing force-creating material is mounted on a surface of each of the first cantilever fingers and binds the predetermined substance to the surface so as to cause each of the first cantilever fingers to bend.

35. (currently amended) The A sensor of according to claim 33, wherein the light source is incident light.

36. (new) An apparatus to measure interactions between a predetermined substance and a sensing material that binds the substance, the apparatus comprising:

a cantilever palette including a plurality of cantilever array blocks, each cantilever array block including a plurality of cantilevers, each cantilever including a plurality of cantilever fingers surrounded by a frame with frame fingers, the cantilever fingers and the frame fingers forming a diffraction grating, wherein each cantilever array block comprises the sensing material selected to interact with the substance predetermined for measurement by the apparatus, such that cantilevers of the cantilever array block deflect in the presence of the substance, causing the diffraction grating to diffract light and thereby provide a change in a diffraction pattern or color of the diffracted light, as a visual indication of the presence of the substance, and wherein the apparatus does not require an external electrical power source, and wherein the sensing material comprises a monoclonal antibody and the substance comprises an antigen, wherein the monoclonal antibody binds to the antigen and the cantilever fingers deflect in the presence of the antigen.